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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/982,845	10/22/2001	Takaharu Kondo	35.C15894	8377

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EXAMINER

GEBREMARIAM, SAMUEL A

ART UNIT PAPER NUMBER

2811

DATE MAILED: 01/09/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/982,845

Applicant(s)

KONDO ET AL.

Examiner

Samuel A Gebremariam

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 November 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 7.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-8, are rejected under 35 U.S.C. 103(a) as being unpatentable over Sano.

Regarding claim 1, Sano teaches a silicon-based film comprising a crystal phase formed on a substrate (1) with a textured shape wherein the silicon-based film is formed on a substrate with a surface of the textured structure (fig. 5, col. 5, lines 1-27).

Sano does not teach the surface shape of the substrate is represented by a function f , wherein the silicon-based film is formed on a substrate with a surface shape having a standard deviation of an inclination arc $\tan(df/dx)$ from 15° to 55° within the range of a sampling length dx from 20 nm to 100 nm, a Raman scattering strength resulting from an amorphous component in the silicon-based film is not more than a Raman scattering strength resulting from a crystalline component, and a difference between a spacing in a direction parallel to a principal surface of the substrate and a spacing of single crystal silicon is within the range of 0.2% to 1.0% with regard to the spacing of the single crystal silicon.

Figure 6 of the specification shows how the function f is defined. Since Sano's substrate is textured as the claimed substrate, Sano's textured substrate can also be

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described by the function f , therefore Sano's substrate would inherently have a surface shape as claimed within a certain sampling range (fig. 5).

Raman scattering and x-ray diffraction performed on Sano's structure would also reveal similar results as claimed since Sano's structure is identical to the claimed structure.

Regarding claim 2, Sano teaches substantially the entire claimed structure of claim 1 above except explicitly stating that the silicon-based film according to claim 1, comprises a crystal of a columnar structure in a thickness direction.

The limitation that the silicon-based film comprises a crystal of columnar structure depends on the substrate. Since the support substrate and silicon based film of Sano's structure are identical to the claimed structure it would inherently have a columnar structure in the thickness direction.

Regarding claim 3, Sano teaches substantially the entire claimed structure of claim 1 above except explicitly stating that the silicon-based film according to claim 1, wherein a percentage of diffraction strength of (220) plane due to X-ray or electron beam diffraction is 30% or more of total diffraction strength.

The limitation that the silicon-based film have a percentage of diffraction strength of (220) plane due to X-ray or electron beam diffraction is 30% or more of a total diffraction strength depends on the silicon based film and the substrate. Since the support substrate and silicon based film of Sano's structure are identical to the claimed structure it would inherently have x-ray diffraction results as claimed.

Regarding claims 4 and 5, Sano teaches substantially the entire claimed structure of claim 1 above except explicitly stating that the silicon-based film according to claim 1, is formed by a plasma CVD method using a high frequency wherein the high frequency is not less than 10 MHz but no more than 10 GHz.

The claimed limitation above is considered product by process claim. "[E]ven though product-by process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985).

Regarding claim 6, Sano teaches substantially the entire claimed structure of claim 1 above including the silicon-based semiconductor layer having at least one pin junction on a support, wherein at least one i-type semiconductor layer comprises the silicon-based film as set forth in any one of claims 1 to 5 (fig. 5).

Regarding claim 7, Sano teaches substantially the entire claimed structure of claim 1 above including the silicon-based semiconductor layer is formed on a substrate comprising at least a first transparent conductive layer stacked on the support, and the first transparent conductive layer 5 has the surface shape textured as the substrate.

Regarding claim 8, Sano teaches substantially the entire claimed structure of claim 1 above including the support is a conductive support 1 (fig. 5, col. 5, lines 1-27).

Response to Arguments

2. Applicant's arguments filed 11/04/02 have been fully considered but they are not persuasive. Applicant argues the reference by Sano does not necessarily follow the surface shape represented by the function f .

The surface taught by Sano is a textured surface as in claim 1. Further the textured layer can be described by a function f . A textured layer has a standard deviation of an inclination (slope) that can be described by the function defined by $\arctan(df/dx)$. If a person of ordinary skill in the art performs a Raman scattering to characterize the surface of Sano's structures within a sampling length as claimed, the result would be the same as claimed invention. Raman spectroscopy is a non-invasive procedure performed on a surface where the result depends on the surface of the specimen under investigation. Since the claimed invention and Sano's structure are similar the Raman scattering result would be the same. Furthermore x-ray diffraction is also a non-invasive procedure that is performed on the specimen under investigation to gain insight on the crystal lattice arrangement. Since the claimed structure is similar to Sano's structure x-ray diffraction performed on Sano's structure would be the same result as the claimed invention.

Conclusion

3. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within

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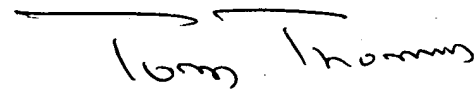
TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Samuel Admassu Gebremariam whose telephone number is 703.305 1913. The examiner can normally be reached on 8:00am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 305-7646. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Samuel Admassu Gebremariam
January 7, 2003


TOM THOMAS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800